

Design thinking and business model innovation

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1 Introduction

This paper explores how design thinking is applied for business model innovation (BMI) of firms. Business model innovation is now no longer a theoretical concept but is increasingly becoming a decisive business practice in many firms (Damanpour, 1990; Gassmann, et al., 2014). And yet, failures in business model innovation are frequently reported (see e.g. Christensen, et al., 2016). To this end, prior studies (e.g. Brown, 2009; Jenkins & Fife, 2014) suggest that the application of design thinking¹ may play a crucial role in developing business model innovation in firms. Yet, we know limited of firms' practices upon this endeavour (Hassi & Laakso, 2011; Johansson-Sköldberg, et al., 2013). This is the point of departure in our paper.

In this study, we adopt two underlying theoretical perspectives: the *static* view focuses on design thinking that is applied in the fundamental building blocks of business model (see e.g. Mitchell & Coles, 2004; Frankenberger et al., 2013); whereas the *processual* view looks into the application of design thinking along the innovation process (see e.g. Bonakdar & gassmann, 2016). First, while the positive effects of BMI on firm performance (Zott & Amit, 2008) have drawn some academic and practitioner attention in recent year, our understanding of this phenomenon remains limited (see e.g. Foss & Saebi, 2017). Furthermore, despite few recent attempts to explore the *BMI process*, Schneider and Spieth (2013) have argued that the understanding of these processes is far from clear and there is a clear lack of relevant empirical studies. More notably, while there may exist a link between design thinking and BMI, it is criticised for missing *empirical evidence* (Hassi & Laakso, 2011; Johansson-Sköldberg, et al., 2013).

To address the issue, a research framework (Figure 1) is constructed from the results of the literature review. We employ qualitative research, conducting six mini case studies in the original equipment manufacturers (OEMs) of the automotive industry to answer two

¹ Design thinking is defined as “a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.” (Brown, 2008, p. 86)

major research questions: how design thinking is applied to in building innovative business model and how design thinking is applied in the business model innovation process. Case studies allow us to surface the complexity embedded in firms' empirical practices. To increase the validity of this study, the informants in each case studies are carefully selected based on their experience, knowledge and engagement in design thinking and business model innovation. To ensure the soundness of our study, we use content analysis (Gläser & Laudel, 2010) and cognitive mapping (Miles, et al., 2014) to analyse a huge amount of data.

This paper contributes to knowledge in three dimensions. First, drawing on both the static and processual view, it provides a more holistic view to advance the understanding upon an important yet much less understood phenomenon in the field of business model and innovation. Second, it posits several research propositions, offering useful guidance for further research in a less addressed topic. Finally, it puts forward practical advice for managers and innovators who seek to harvest from their efforts in applying design for business model innovation.

The paper is divided into five sections. First, a literature review addresses the theoretical underpinnings of business models, business model innovation and design thinking and presents the conceptual framework which guides this study's data collection and analysis. Second, the methodology applies by this paper is presented and justified. Third, an overview of the data analysis and research findings of this study is given. Fourth, the research results are discussed in relation to relevant literature and theoretical propositions are formulated. Finally, the practical and theoretical contributions of this study and limitations of the research findings are presented.

2. Theoretical underpinnings and conceptual framework

2.1 Business Model

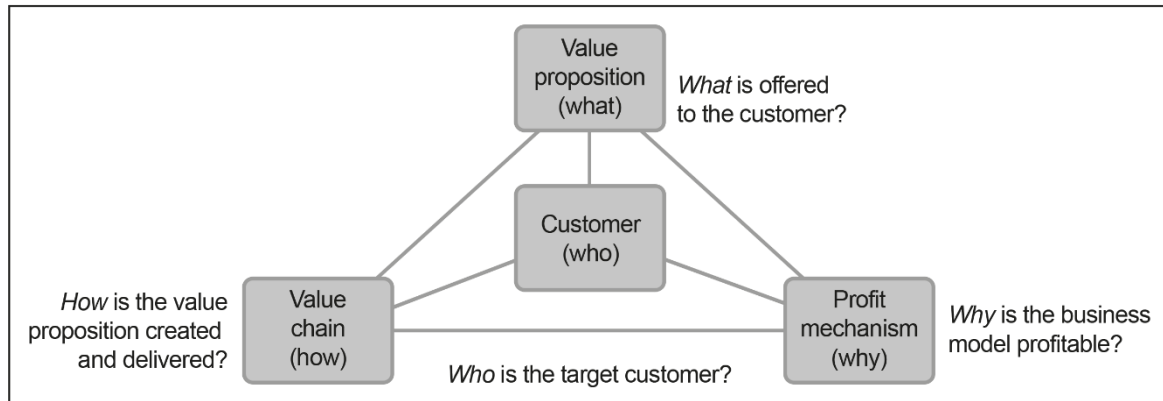
Academics from different fields of research participate in the scientific discourse focussing on business models which caused a heterogeneous understanding of the concept (Wirtz, et al., 2016, p. 85). Despite the plurality of definitions, there appear to be four central themes emerging from the literature.

First, business models are described as a tool or model with the main purpose of describing, in a conceptual manner, firms' value creation, capture, and delivery (Zott, et al., 2011; Stampfl, 2016; Shafer, et al., 2005; Jensen, 2013; Gassmann, et al., 2014; Baden-Fuller & Morgan, 2010). Second, business models are defined as an intermediary between technological innovations and the market, and as a means to commercialise new technologies through new or adapted business models (Chesbrough & Rosenbloom, 2002; Baden-Fuller & Haefliger, 2013; Tongur & Engwall, 2014). Third, business models are referred to as a strategic variable, acting as a source of competitive advantage (Wirtz, et al., 2016; Foss & Saebi, 2017; Casadesus-Masanell & Ricart, 2010), representing an area of possible innovation and a means to react to external changes (Gassmann, et al., 2014; Wirtz & Daiser, 2017; McGrath, 2010). Fourth, business models are explained as a value network, spanning beyond the activities of a focal firm and including its customers and partners (Zott, et al., 2011; Shafer, et al., 2005). In this paper, we adopt Teece's definition of business model: *"A business model articulates the logic (...) that demonstrates how a business creates and delivers value to customers. It also outlines the architecture of revenues, costs, and profits associated with the business enterprise delivering that value"* (p. 173).

Numerous researchers have supposed frameworks to articulate firms' business model (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Morris, et al., 2005; Osterwalder & Pigneur, 2010; Gassmann, et al., 2014). In spite of the heterogeneity of business model frameworks, a literature reviews conducted by Morris, et al. (2005) and Wirtz, et al. (2016) identified four common elements in various frameworks, namely the customer, value proposition, profit mechanism and value chain. First, the customer element identifies the target customers addressed with the business model and articulates their problem to be solved (Wirtz, et al., 2016; Gassmann, et al., 2014). Second, the firm's value proposition, which is the central (Zott, et al., 2011, p. 1037) and most frequently used element of a business model (Wirtz, et al., 2016; Morris, et al., 2005), describes an organisation's solution to a customer's problem and the potential benefits of the offering (product or service). Third, the profit mechanism explains how value is captured and includes aspects such as the revenue and cost model (Gassmann, et al., 2014; Wirtz, et al., 2016; Morris, et al., 2005). Fourth, the value chain explains how the value proposition can be "effectuated by the capabilities and resources of the focal organisation" (Wirtz, et al., 2016, p. 95).

For this study, the framework by Gassmann, et al. (2014, p. 7) is used as it has the adequate degree of abstraction needed for the purpose of this research (see Figure 3).

Figure 1: Business model elements



Source: Own representation, based on Gassmann, et al. (2014, p. 7)

2.2. Business Model Innovation

In scientific research, it has been widely acknowledged that BMI is a powerful tool for organisations to achieve superior performance (Frankenberger, et al., 2013; Eurich, et al., 2014; Gassmann, et al., 2014). Despite the considerable amount of studies which were published recently, some authors still argue that a theoretical foundation seems to be lacking (Foss & Saebi, 2017, p. 201).

Despite some conflicting views on the BMI definition, conceptualisations seem to agree upon the core of BMI: changing or developing BM elements (Mitchell & Coles, 2004; Frankenberger, et al., 2013). These alterations should output the creation of new mechanisms and interconnections between BM elements (Osterwalder & Pigneur, 2010, p. 136), the provision of new offerings to customers (Mitchell & Coles, 2004), and ultimately the satisfaction of new or hidden customer needs (Osterwalder & Pigneur, 2010, p. 136).

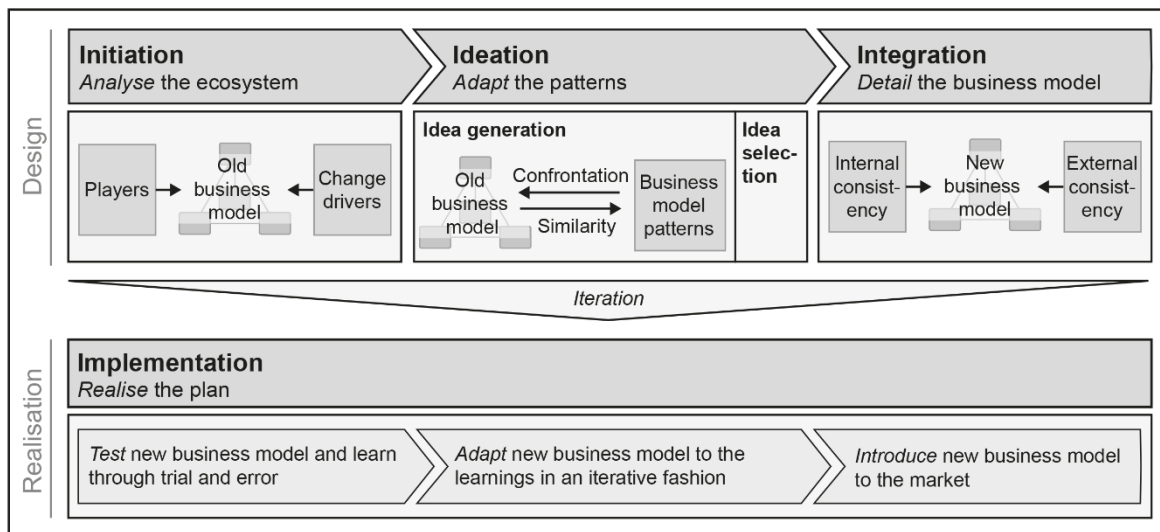
To develop a common terminology in this study, BMI in this work is defined as follows: *Business model innovation is a process of distinguishable steps, reconfiguring the interaction of business model elements by changing at least two of the four key dimensions in a way which is new to the firm. The aim of business model innovation is, first, to meet unsatisfied, new, or hidden customer needs and, second, to create sustainable competitive advantage and growth for the company.*

While studies in the discourse of BM and BMI have increased significantly in recent years (Zott, et al., 2011), the majority of contributions have taken a static view on the concept (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Morris, et al., 2005; Gambardella & McGahan, 2010). Owing to the amount of attention paid to BMI concepts and definitions

(Ahokangas & Myllykoski, 2014, p. 8), the process of achieving BMI has been widely neglected by academics (Frankenberger, et al., 2013, p. 250). Only few scholars so far have examined business model innovations as a process that is comprised of phases or process steps (Frankenberger, et al., 2013, p. 255). Pynnönen, et al. (2012) provide, for instance, a six-step approach to BMI which aims for accomplishing a strategic objective. Mitchell & Coles (2004) describe a four-step process which should lead to a firm's competitive advantage. Chesbrough (2007) proposes a five-step approach which focusses on the maturity of current business models. Teece (2010), finally, provides a list of four high-level process steps which should lead in combination with strategic analyses to innovative business models.

The iterative BMI process by Frankenberger, et al. (2013, p. 264), illustrated in Figure 4, is based on an extensive review of existing BMI processes and a large-scale research project. It can be seen as arguably the most comprehensive, integrative BMI process framework to date (Bonakdar & Gassmann, 2016, p. 58), which is why it was chosen for this study. The generic 4I-framework for BMI proposed by Frankenberger, et al. (2013) includes four distinct phases: The first step, called initiation, consists of the description of the current business model, of the understanding of the innovating firm's surrounding ecosystem (e.g. customers, competitors and partners), and of the identification of business model change drivers (e.g. technological, regulatory, or behavioural shifts). The second step, called ideation, focusses on the conversion of opportunities identified in the initiation phase into new business model ideas. By starting with a presentation of successful business model patterns from other industries (Gassmann, et al., 2014) numerous ideas should be generated, and the most promising ones selected. In the third step, called integration, the previously selected ideas are further developed into viable business models by aligning the ideas along all four dimensions of a business model and by creating internal (resources and capabilities) and external consistency (customer, partners, and competitors). The final step, called implementation, is concerned with the step-by-step re-design and realisation of the fully designed new business model.

Figure 2: Business model innovation process



Source: Own representation, based on Frankenberger, et al. (2013, p. 264)

2.3. Business Model Innovation Barriers

The focus of papers on BMI barriers is on internal barriers (Chesbrough & Rosenbloom, 2002; Von den Eichen, et al., 2015) with solely few mentioning external ones (Birkin, et al., 2009; Lange, et al., 2015).

One of the most commonly expressed internal barrier is the corporate culture (Frankenberger, et al., 2013; Stampfl, 2016), as it is perceived to be a source of reluctance and resistance to implementing change. Another barrier is internal competition, as old and new business models compete for resources (Frankenberger, et al., 2013). Search-related barriers are related to difficulties overcoming the dominant industry logic in the business model idea generation (Frankenberger, et al., 2013; Von den Eichen, et al., 2015). Finally, system-related barriers are concerned with lengthy and inefficient decision making during the innovation process (Stampfl, 2016, p. 149).

Externally, BMI barriers are mostly related to customer rigidities when it comes to adapting to new business models (Stampfl, 2016, p. 149). A second external barrier commonly described is lacking alignment with external partners (Frankenberger, et al., 2013).

Von den Eichen, et al. (2015, p. 29) argue that these barriers need to be addressed in the BMI process to avoid failure.

2.4 Design Thinking

Despite the growing popularity of the concept in research and practice, it is often criticised as being anecdotal rather than theoretically or empirically based (Johansson-Sköldberg, et al., 2013). Scholars, therefore, argued for the necessity of empirical work to complement anecdotal evidence with successful use cases of DT (Hassi & Laakso, 2011). While Martin (2009) argues that “the larger the company, the less likely it will be perceptive to design thinking”, barriers, which firms need to overcome to apply DT in their organisation, are rarely examined.

In the most general definitions, DT is outlined as a “systematic and collaborative approach for identifying and creatively solving problems” (Luchs, 2016), or as the balance between “analytical mastery and intuitive originality” (Martin, 2009, p. 6) in problem-solving.

More specific definitions describe DT as “a way of finding human needs and creating new solutions using the tools and mindsets of design practitioners” (Kelley & Kelley, 2013) or as “a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity” (Brown, 2008). For the purpose of this study, the latter definition of design thinking is used.

Design thinking is characterised by key principles which are essential for the method’s success (Brenner, et al., 2016, p. 8). Hassi & Laakso (2011) identified in a literature review three main groups of elements: Methods, tangible activities and tools; cognitive approaches, thinking processes and styles; and mind-sets, the mentality on which problems are approached. From a cognitive perspective, *Abductive thinking* can be defined as “the logic of what might be” (Lockwood, 2009) or the exploration of what could be (Liedtka & Ogilvie, 2011) and is used to “challenge accepted explanations and infer possible new worlds” (Martin, 2009). *Reflective reframing* refers to the ability to present the problem in a new way (Drews, 2009) by “looking beyond the immediate boundaries of the problem to ensure the right question is being addressed” (Hassi & Laakso, 2011). Most authors argue that *integrative thinking*, “bringing competing constraints into a harmonious balance” (Hassi & Laakso, 2011), is at the core of DT (Schallmo, 2017), as it always tries to find a balance between opposing models, such as desirability, viability and feasibility (Brown, 2009), exploitation and exploration (Martin, 2010), intuitive and analytical thinking (Martin, 2010), or human-centeredness and company-centricity (Sato, et al., 2010).

Having an *experimental and explorative* mind-set is seen as a key success factor of DT (Brown, 2008, p. 87) because missteps as a result of exploration are perceived as a natural part of the innovation process and “failing often and early” (Brenner, et al., 2016) is a preferred means of testing ideas at moderate risk (Liedtka & Ogilvie, 2011). Another key

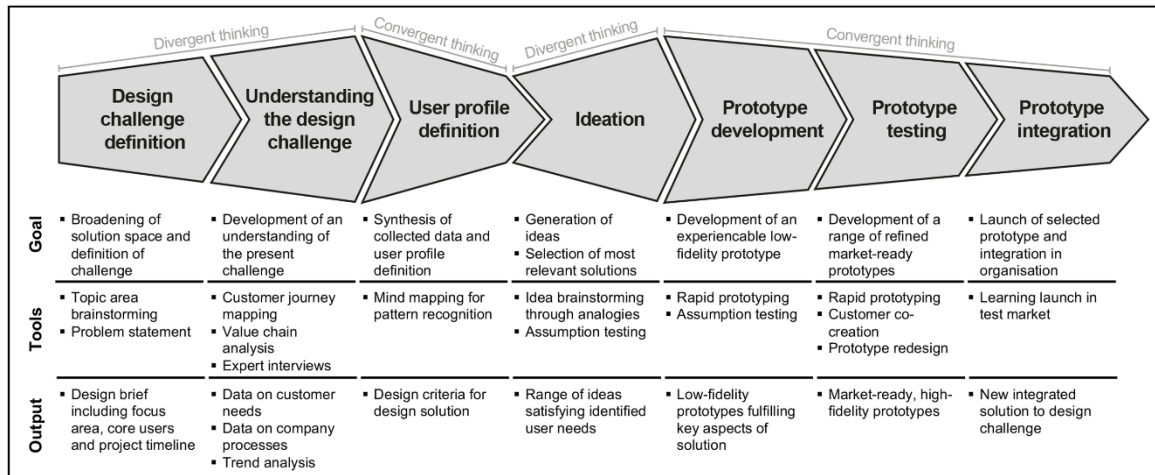
feature of the design thinkers' mind-set is a high *ambiguity tolerance* (Drews, 2009), as the process is "emerging rather than deterministic" (Copper, et al., 2009). Design thinking is often described as a *future-oriented* innovation method (Brenner, et al., 2016) anticipating and envisioning new scenarios (Martin, 2009) based on a strong vision.

Several authors have developed iterative processes consisting of a given number of steps and incorporating the aforementioned principles (Brown, 2009; Plattner, et al., 2009; Liedtka & Ogilvie, 2011; d.school, 2017; Brenner, et al., 2016). Based on a literature review, Schallmo (2017, p. 44) developed an integrative process model of DT, combining all major processes existing to date. The process comprises seven phases (see Figure 5).

In the first process step, the problem space is explored (Leifer & Steinert, 2014), possible topic areas are identified, and a broad area of focus is chosen (Schallmo, 2017). The focus of the second step is on an accurate, in-depth assessment of the present by observing typical users' hidden customer needs, by analysing potential areas for value creation for the firm and by surveying experts in the topic area (Schallmo, 2017). In the third step, the previously selected insights are synthesised to define common user archetypes and profiles (Schallmo, 2017, pp. 51-52) and to identify new emerging patterns of user needs and requirements. In the ideation phase, hypotheses of possible futures are developed through the use of abductive thinking (Schallmo, 2017). By thinking beyond current constraints creative ideas are generated and developed into more concrete concepts. In the prototyping step, the previously developed concepts are translated into low-fidelity and low-resolution (Liedtka & Ogilvie, 2011) prototypes, using tools such as rapid prototyping (Schallmo, 2017). The prototype testing phase is primarily concerned with learning about the user interacting with the prototype, collecting real-time data on the new concept (Schallmo, 2017) and gradually moving to higher-fidelity prototypes through customer co-creation. The final process step focusses on the selection of the prototype with the highest potential and the integration of the new concept into the current organisation (Schallmo, 2017).

The preceding discourse might give the impression that DT is a linear process. In fact, DT is described in the literature as a holistic, iterative approach of "overlapping spaces rather than a sequence of orderly steps" (Brown & Wyatt, 2010, p. 33).

Figure 3: Design thinking process



Source: Own representation, inspired by Schallmo (2017) and Liedtka & Ogilvie (2011)

2.5. Applications of Design Thinking to Business Model Innovation

The number of publications concerned with the application of DT to BMI appears to be relatively modest. Most academic articles covering this topic either focus solely on a specific part of the innovation process (Amano, 2014), refer to corporate venturing or entrepreneurship in general (Abrell & Uebernickel, 2014; Abrell, et al., 2014) or dedicate a minor section to it (Prud'homme van Reine, 2017).

Bonakdar & Gassmann (2016) have made one of the few contributions that is explicitly concerned with the entire BMI process. According to them, the “iterative design thinking approach adds significant value when creating radical new business models” (p. 60). A limitation of their theoretical study is, however, the lack of empirical evidence on which the findings are based.

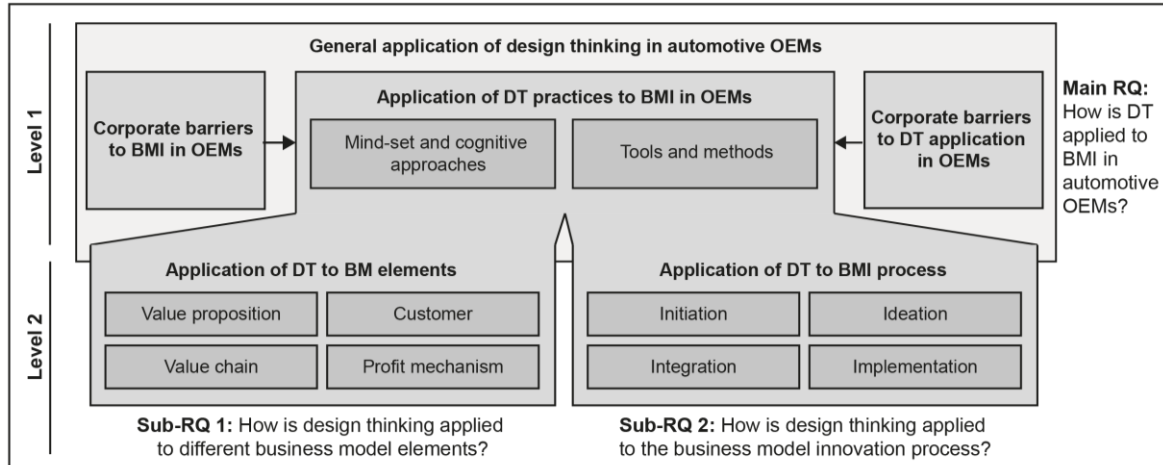
Jenkins & Fife (2014) also cover DT in BMI but rather from a strategic standpoint. While arguing that “the process of business model innovation can be greatly enhanced with the application of design thinking” (p. 2850), it remains unclear how DT can be applied and which specific advantages this has for organisations.

2.6 conceptual Framework

The conclusions from the literature review have contributed to developing a conceptual framework for the conduct of this research inquiry. The conceptual framework, which is

directly linked to the research questions, informs the data collection, analysis and final research propositions made by this study.

Figure 4: Conceptual framework



Source: Own representation, based on the literature review

3. Methodology

3.1 Research Strategy

With the research objectives set, the inductive, exploratory approach of Eisenhardt (1989), who uses selected qualitative case studies to build new constructs, was seen as the most suitable research strategy for this inquiry. The researcher's rationale behind this followed three key reasons. Firstly, Eisenhardt (1989) argues that construct development from multi-case studies is "most appropriate in the early stages of research on a topic" (p. 548). As empirical studies on DT are relatively rare (Schneider & Speith, 2013; Hassi & Laakso, 2011), the researched topics seemed to be well-suited for this method. Furthermore, according to Yin (2014, p. 14), the case study as a research strategy is particularly pertinent when "a how (...) question is being asked about a contemporary setting" which was the case in this research inquiry. Secondly, as a result of the novelty of the two theoretical concepts this inquiry is based on, a deliberate selection of cases in which "the process of interest is transparently observable" (Eisenhardt, 1989, p. 537) was seen as favourable. The approach by Eisenhardt (1989) provided this flexibility through criterion-based sampling. Thirdly, the purpose of the inductive approach by Eisenhardt (1989) is to build new constructs based on empirical evidence. As this study seeks to develop a novel conceptual model and to further advance the understanding of DT in the BMI process, it is well in line with the presented research strategy (qualitative multiple case study research).

3.2. Data Collection

Given the selected multi-case study research strategy, interviewing was chosen as the data collection method since it encourages an in-depth exploration of a particular topic (Charmaz, 2014, p. 18). Before conducting interviews, a semi-structured interview guide was prepared and pretested. Each interview lasted approximately 35 minutes and was conducted via phone or Skype. The interviews were recorded for later transcription and analysis. All one-on-one expert interviews were held in English language. Two key activities are conducted at this stage of the research (Eisenhardt, 1989). Firstly, the wider population of interest is specified. For this study, the selected population is the automotive industry, particularly OEMs. In the second step, cases are purposively selected based on their theoretical usefulness, which accords with the nature of qualitative enquiries (Miles & Huberman, 1994, p. 27) and research questions exploring the “how” (p. 29). Due to the novelty of the two theoretical concepts, OEMs were chosen as cases which already had some experience with the concepts. Royer & Zarlowski (2001) argue that “determining the size of a sample really comes down to estimating the minimum size needed to obtain results with an acceptable degree of confidence” (p. 150). Due to the limited number of OEMs with experience in DT, three cases of OEMs (see Table 1) were investigated in this research.

Table 1: Overview of case companies

Company Code	Firm Profile	Location	Number of Interviewees
OEM_1	Mass automobile manufacturer	Germany	3 (One employee of OEM_1, two external consultant working with OEM_1)
OEM_2	Mid-priced automobile manufacturer	Germany	2 (One employee of OEM_2, one external consultant working with OEM_2)
OEM_3	Premium automobile manufacturer	Germany	One employee of OEM_3

Source: Own representation, based on interviews

To achieve a diversity of perspectives and content, both participants who worked internally (employees) and who worked externally (consultants) on DT projects within the selected OEMs were chosen for this study. Participants of this study were all recruited through the personal network of the researchers. A summary of the participants of this study can be found in Table 2.

Table 2: Overview of research participants

Pseudonym	Type of Organisation	Job Title [anonymised]
Interviewee_1	OEM	Innovation Manager
Interviewee_2	Strategy Consultancy	Manager (focus on automotive)
Interviewee_3	OEM	Project Manager Innovation
Interviewee_4	OEM	Design Thinking Consultant
Interviewee_5	Innovation Consultancy	Senior Consultant (focus on automotive)
Interviewee_6	Innovation Consultancy	Consultant (focus on automotive)

Source: Own representation, based on interviews

3.3. Data Analysis

This research inquiry intended to bring practical, reliable and valid information into the body of knowledge by reducing the accumulated data into decoded recommendations and research propositions. The specific purpose of this study was to explore the application of DT to the innovation of business model elements and to the BMI process in OEMs. Based on the conceptual framework, the data analysis was split into two parts, respectively levels of analysis.

Two data analysis methods were used in this research inquiry. First, to understand the general application of DT to BMI (RQ 1), content analysis was used to identify key themes from the large amount of transcribed data (Gläser & Laudel, 2010, p. 20). Second, to understand the application of DT to different BM elements (Sub-RQ 1) and different BMI process steps (Sub-RQ 2) cognitive mapping was applied. Allard-Poesi, et al. (2001) advocate the combination of content analysis and cognitive mapping in qualitative data analysis as it is “one of the most popular methods of analysing discourse and representations in management” (p. 356) research today.

On the first level of analysis content analysis was used because it is argued that content analysis can enable the researcher to go beyond a pure description of the content (Allard-Poesi, et al., 2001, p. 346). The computer-assisted qualitative data analytics software (CAQDAS) used for this study was NVivo (Version 11), which was applied to convert the unstructured data into structured data through the process of descriptive coding (Miles, et al., 2014, p. 74). To achieve reliability in data coding (Yin, 2018, p. 168) this inquiry based the coding categories on the conceptual framework (see Figure 10). Within the predetermined categories from the template, open coding was applied. Through following Tesch’s eight coding steps (Creswell, 2014, p. 198), the identified themes within each

category were then further grouped into higher- and lower-order themes (i.e. themes and sub-themes) through pattern coding (Miles, et al., 2014, p. 86).

On the second level of analysis, cognitive mapping was applied (Miles, et al., 2014, p. 187) to investigate sub-research questions 1 and 2. It is argued that “cognitive mapping (...) reveals a thought’s complexity more precisely than simple content analysis can” (Allard-Poesi, et al., 2001, p. 356). Therefore, links between the organisational DT practices (Category 3) and the four predetermined BM elements (Category 4), respectively four BMI process steps (Category 5), were drawn to identify the applicability of DT to the different elements/process steps. A study and is enhanced through a case study protocol in the data collection, i.e. a clear explanation of the research questions in the interview (Yin, 2018, p. 46), and through coding based on theoretical propositions in the data analysis (Miles, et al., 2014, p. 314). For these reasons, this study linked the interview guide closely to the research questions and based the categories for coding on the literature review.

Detailed data presentation is available upon request.

4. Discussion of Research Findings

Main Research Question – Application of DT to BMI in OEMs

“Business model innovation is vitally important, and yet very difficult to achieve” (Chesbrough, 2010, p. 362). Both the dissertation’s findings and academic literature provide evidence for the importance of innovation but also for the existence of barriers which need to be overcome for successful BMI.

The majority of interviewees indicated that a diverse understanding of innovation complicates the process. According to the data, the domain of change acts as one source of divergent understandings. Those findings go hand in hand with the explanations given by Von den Eichen, et al. (2015, p. 30) who argue that “most innovations are associated with products, which is plausible because innovation is manifested in products and therefore becomes (more) tangible”.

A second barrier mentioned by the majority of interviewees were (internal and external) lock-in effects. This dissertation’s findings are in line with the academic change management literature which reports a “difficulty to overcome the current business logic..., as teams are locked into the logic used by the current business model and industry” (Frankenberger, et al., 2013, p. 259). Internally, it is argued that “people are reluctant to change... due to the fact that they do not see a reason to change, as the old business model is still working well” (Frankenberger, et al., 2013, p. 261). These lead us to propose our first proposition:

Proposition 1: Key corporate barriers to BMI in OEMs are related to a divergent understanding of BMI and organisational lock-in effects

“Generally, the larger the company, the less likely it will be perceptive to design thinking” (Martin, 2009, p. 115). Confirmed by the literature, this study’s research findings indicate that the application of DT in large organisations could be a difficult endeavour.

The research data showed that managers tend to oppose the ambiguity associated with the DT process. This finding goes hand in hand with results of Martin (2007, p. 131) who argues that the management of large organisations focusses on the reliability of processes

(producing replicable outcomes) whereas DT is centred around validity (producing the desired outcome). As DT is argued to be “opportunistic; the path of exploration cannot be predicted in advance” (Collins, 2013, p. 37). Both the research findings and literature indicate that as a result, DT “has on occasion been reduced to a more linear process” (Collins, 2013, p. 36).

Collins (2013, p. 36) argues that “there is undoubtedly a need to develop a common understanding and language if we are to discuss design processes and methods for engaging in design thinking”. Both the empirical evidence and literature (Martin, 2009, p. 85) express the need for familiarising employees with the DT method to support its acceptance by doing workshops with managers or by facilitating day-to-day projects (Tschimmel, 2012, p. 18). Therefore, we posit:

Proposition 2: Corporate barriers to the application of DT in OEMs are primarily based on the ambiguity involved in DT

In the academic literature, the DT concept is primarily, with the exception of some authors (Drews, 2009; Liedtka & Ogilvie, 2011; Tschimmel, 2012), described as a standalone method for innovation. These authors argue that the value of DT is to break out of the predominant structures and decision processes in organisations and to innovate in a more agile and efficient manner (Knapp, et al., 2016; Freudenthaler-Mayrhofer & Sposato, 2017). On the other side, it is argued that “connecting the creative design approach to traditional business thinking, based on planning and rational problem solving” (Tschimmel, 2012, p. 2) creates the real value of DT. This study’s findings support the second notion, as the data showed evidence that practitioners complement the DT method with other, often traditional, methods.

One potential reason for the complementary use of DT could be that organisations are not yet ready to accept the ambiguity and uncertainty inherent in the DT method. This explanation goes hand-in-hand with the previously described organisational barriers to the DT application. A second potential explanation for the observed use of DT could be instead of the inability, the conscious decision not to apply DT as a standalone method. The value of design thinking described in the literature is commonly along the lines of “(1) deep and holistic user understanding; (2) visualization of new possibilities (...); and (3) the creation of new activity systems to bring the nascent idea to reality and profitable operation” (Martin, 2009, p. 88). While the interviewees confirmed the first two components of DT, the majority

did not see the particular value of DT for the implementation of new ideas. Tschimmel (2012, p. 17) recommends in her paper that managers could "introduce DT tools into the existing stages of their innovation processes, without being attached to a specific DT process model". This practice of DT was commonly explained by the interviewees. Therefore, we suggest:

Proposition 3: In practice, DT is complemented with other innovation techniques

Sub-Research Question 1 – Application of DT to Different BM Elements

The empirical data collected in this study shows that DT is perceived to provide the most value for innovating the *value proposition*. The value of DT for innovating the offering (product or service) is stated by numerous authors (Clarke & George, 2005; Liedtka, 2011; Tschimmel, 2012). Both existing research and this study's findings indicate that DT could support through the collection of "insights about the users' [hidden] needs" (Tschimmel, 2012, p. 8), through the utilisation of analogies in the ideation (Gassmann, et al., 2014), through prototyping for user tests (Liedtka & Ogilvie, 2011, p. 32) and through customer journey analyses synthesising the collected ethnographic insights (Dalton & Kahute, 2016, p. 25).

The *customer* dimension was perceived by the interviewees as the second-best fitting business model element for the innovation through DT. In the DT literature, one of the most emphasised elements of DT is its deeply human-centred approach, placing "people first" (Brown, 2008; Brenner, et al., 2016; Liedtka, 2011). The research data and academic literature both underline the deep customer understanding gained through ethnographic observation, customer personas and their user journeys (Brown & Wyatt, 2010, p. 33). Hassi & Laakso (2011, p. 9) also argue that through "looking beyond the immediate boundaries" when problems are reframed, the real target user can be identified.

The interviewees were of the opinion that DT can also be used to innovate the internal value creation in the *value chain*, albeit to a lesser degree, as only some tools could be transferred from a customer-centric to an internal user-centric perspective. The innovation of the value chain is not explicitly mentioned in the literature as a strength of DT. However, a fit between the challenges associated with innovating the value chain and the DT method can be identified in the literature (Hassi & Laakso, 2011; Knapp, et al., 2016; Plattner, et al., 2009)

Finally, the *profit mechanism* dimension was perceived by the participants as the least likely to be innovated through classical DT methods. This notion is supported by the DT literature in the sense that revenues, costs or profit are rarely mentioned as typical DT components. One of the few authors who describes the importance of financial viability is Brown (2008, p. 86), as he indicates that DT should output a solution which “a viable business strategy can convert into customer value and market opportunity” (Brown, 2008, p. 86). Thus,

Proposition 4: *DT is most applicable to innovating the value proposition and identifying new target customers and least applicable to innovating the value chain and profit mechanism*

Sub-Research Question 2 – Application of DT to the BMI Process

The *initiation* phase is concerned with an analysis of the innovating organisation’s surrounding ecosystem, of business model change drivers and of the own business model. The research data revealed that the participants perceived DT to be of value for understanding the customer and own business, but less suitable for understanding external change drivers other than the customer. Both the findings and literature indicate that DT particularly supports observing and gaining insight, thus uncovering needs, which customers are not yet aware of (Brown, 2009, p. 41). The participants’ experience, that visualisations in DT can facilitate the understanding of intangibles like the business model, is also represented in the literature (Liedtka & Ogilvie, 2011, p. 49). To analyse change drivers and the ecosystem unrelated to the customer, more traditional methods are preferred by both the literature (Bonakdar & Gassmann, 2016, p. 60) and the participants.

Design thinking was perceived by the participants as particularly well suited to support the business model *ideation*. The value of DT for the idea generation and refinement is also outlined by several other authors. Brown & Wyatt (2010, p. 34) stated that “interdisciplinary teams (...) may generate hundreds of ideas”, which is consistent with this study’s findings. Participants also emphasised that DT can support overcoming the dominant industry logic, which is in line with Bonakdar & Gassmann (2016). Finally, both interviewees and academics mentioned that divergent thinking can support the openness to trying alternative paths towards a solution (Drews, 2009, p. 40).

The previously selected ideas from the ideation are further developed into viable business models in the *integration* phase. This involves creating internal and external consistency.

Both the literature and this study's findings indicate that DT can support this step. Regarding the internal consistency, prototyping could support understanding and communicating the business model and can "help innovators build empathy to all business model participants" (Bonakdar & Gassmann, 2016, p. 64). Externally, organisations can "develop whole 'customer journeys', where a fictional customer is taken through all stages of a new business model scenario" (p. 64) to test assumptions about customer desires.

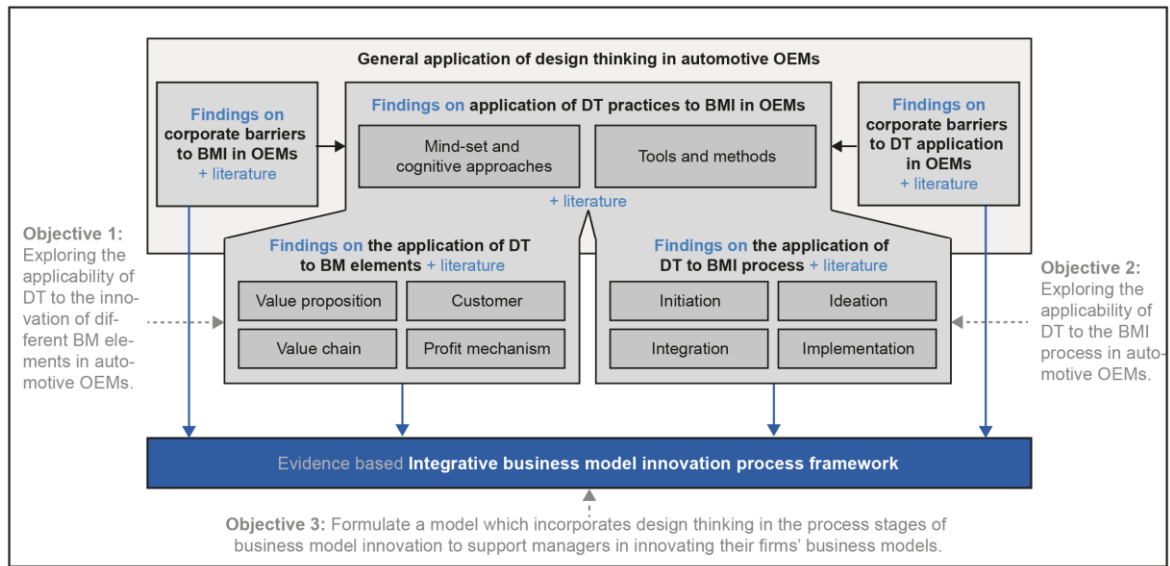
The research findings indicate that participants perceived DT to be of relatively limited value in the *implementation* phase. This finding is surprising given that the theory indicates that DT can be broken down into three components, one being "the creation of a new activity system to bring the nascent idea to reality and profitable operation" (Martin, 2009, p. 88). Brown & Wyatt (2010, p. 35) also indicate that "the third space of the design thinking process is implementation, when the best ideas generated during ideation are turned into a concrete, fully conceived action plan". Therefore, we assume:

Proposition 5: DT is most applicable to the ideation and integration phase of the BMI process and least to the initiation and implementation step

Integrative Business Model Innovation Process Framework

Based on the findings of the study and its discussion with relevant literature, this inquiry proposes an evidence-based integrative BMI process framework. The framework (see Figure 31) is an attempt to mitigate the barriers to BMI by leveraging valuable DT practices while taking into account organisational barriers to applying DT. The close connection of this model to this study's objectives and the logic behind the framework development is illustrated in Figure 30.

Figure 5: Framework development logic



Source: Own representation

The positive effects of DT on organisational innovations was proven by numerous authors (Martin, 2009; Drews, 2009; Jenkins & Fife, 2014). However, it is argued that “organizations need to make their design thinking initiatives more powerful, impactful, and reliable to be a repeatable engine for growth” (Dalton & Kahute, 2016, p. 22). On the other side, several academics emphasise the need for the development of new customer-centric tools and methods to support managers in their BMI efforts (Frankenberger, et al., 2013; Holm, et al., 2013; Schneider & Speith, 2013; Gassmann, et al., 2014).

The proposed framework attempts to balance this reliability and validity (Martin, 2009, p. 53), as it seeks to provide a reliably replicable process to BMI which in turn yields through DT the insights and innovations organisations actually need. Drews (2009, p. 43) states that “the beauty of design thinking is that it is a method that can happily function alongside traditional business methods”. Hence, the proposed integrative framework is based on the BMI process of Frankenberger, et al. (2013) but incorporates DT into the process to combine the best of both worlds.

In the following, the proposed framework is briefly outlined. Even though the framework' visual representation might give the impression of linearity, the process is both iterative between innovation phases and within them.

Initiation. The process framework is divided into five instead of four phases, as both the interviewees and literature underline the importance of setting the stage before the actual

project begins (Osterwalder & Pigneur, 2010; Dalton & Kahute, 2016) by *staffing* the right team (Brown, 2009; Plattner, et al., 2009; Knapp, et al., 2016), defining the *time and space* of the project (Martin, 2009; Von den Eichen, et al., 2015), and formulating a project *design brief* (Brown & Wyatt, 2010; Liedtka & Ogilvie, 2011).

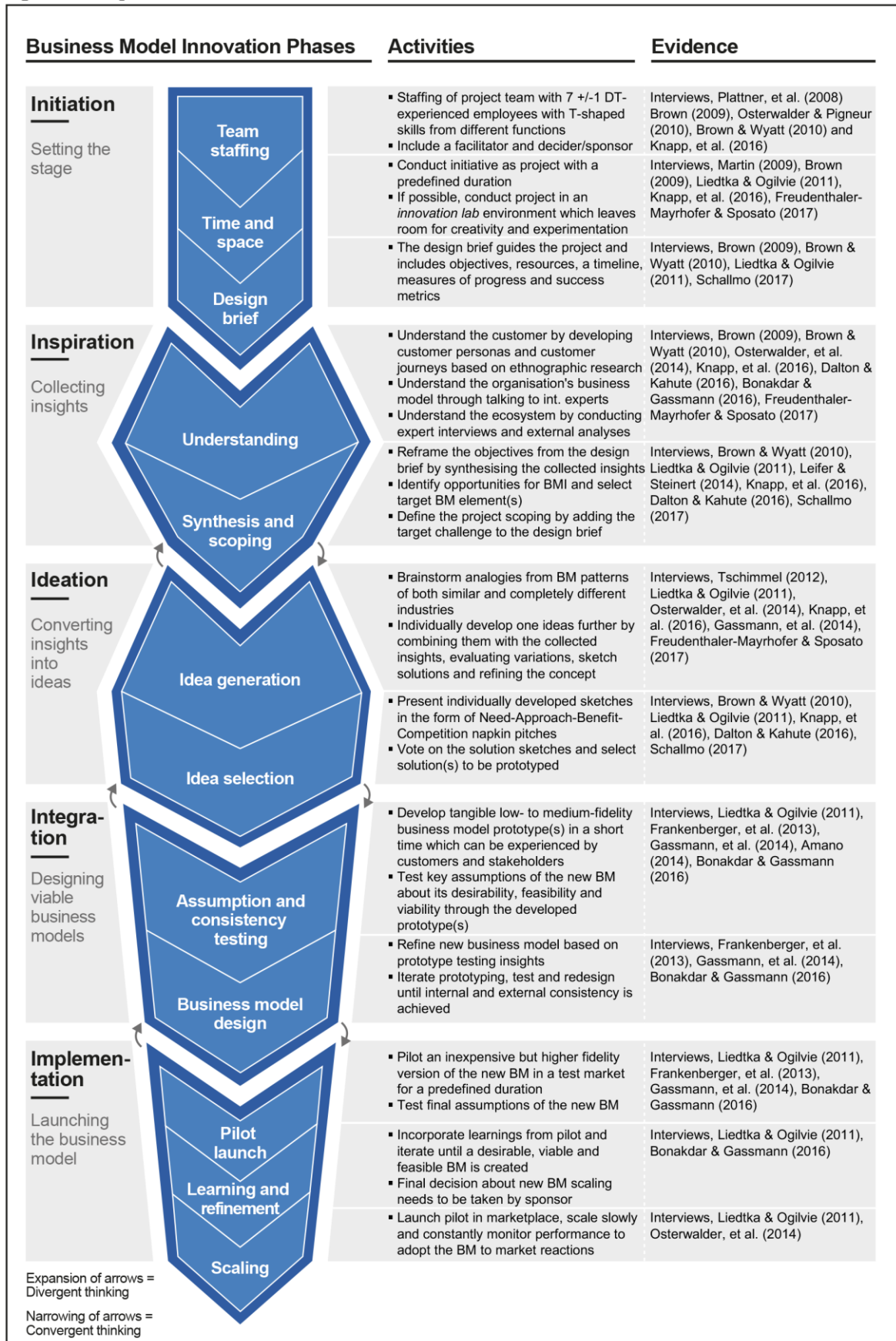
Inspiration. The second phase corresponds content-wise with the initiation step of Frankenberger, et al. (2013), however, is titled inspiration. In this phase inspiring and revealing insights about the own business model and external ecosystem are collected (Brown, 2009; Knapp, et al., 2016) and synthesised into opportunities (Dalton & Kahute, 2016). In the *understanding* step, insights are gained by combining both user-centric DT research methods (Brown & Wyatt, 2010; Dalton & Kahute, 2016) and traditional external analysis methods (Bonakdar & Gassmann, 2016; Freudenthaler-Mayrhofer & Sposato, 2017). These insights are in the *scoping* step utilised to reframe the problem (Drews, 2009) and to formulate a target challenge (Liedtka & Ogilvie, 2011).

Ideation. As the name implies, in the ideation phase possible ideas for solutions to the target challenge are *generated* through collective brainstorming (Tschimmel, 2012; Gassmann, et al., 2014) and individual solution sketching (Knapp, et al., 2016). The refined ideas are pitched in a second *selection* step, and the most promising one(s) is/are chosen for further development (Liedtka & Ogilvie, 2011; Schallmo, 2017).

Integration. As stated by Frankenberger, et al. (Frankenberger, et al., 2013, p. 261), ideas about new business models often start from one or two dimensions. Thus, the integration phase is dedicated to designing viable and feasible business models. By building medium-fidelity prototypes of the new business model (Amano, 2014; Gassmann, et al., 2014), internal as well as external *consistency* can be tested, and the feedback can be integrated in the *design* step into a higher fidelity, marketplace testable model.

Implementation. Finally, in the implementation phase, the new business model is introduced to a test market to test remaining assumptions (Liedtka & Ogilvie, 2011; Gassmann, et al., 2014). The collected feedback can then be used as a basis for the management's decision on the final roll-out and scaling (Liedtka & Ogilvie, 2011). Through constant monitoring, the new business model can further be tailored to stakeholder needs (Osterwalder, et al., 2014).

Figure 6: Integrative Business Model Innovation Process Framework



Source: Own representation, based on interviews and literature above

5. Conclusion

The purpose of this study was to explore how design thinking is applied to business model innovation in automotive OEMs and to develop a theoretical framework incorporating DT into the BMI process. Key practical and theoretical implications of this study are summarised.

Implication 1 – Application of DT: DT is complemented with other concepts in practice.

In the academic literature, the DT concept is predominantly, with the exception of Drews (2009), described as a standalone method for innovation. This notion seemingly differs from the research findings, as practitioners indicated that they complement the concept rather with other tools or merge it with other organisational processes than using it in isolation. Hence, this study suggests further research on the compatibility of DT with prevailing organisational structures in order to align the theoretical and practical notion of the concept.

Implication 2 – Understanding of DT: Different notions of DT concept in practice.

Against the proposition of Brenner, et al. (2016), who argues that the probability of successfully applying the DT concept by solely following the DT principles, without any structure, is relatively low, the study's findings indicated that on several instances solely selected parts of the DT process were used or even only the mind-set was adopted. This insight, which is in line with the results of Schmiedgen, et al. (2015) presented in a study about practitioners' understanding of the concept, identified a seemingly divergent notion of DT in theory and practice.

Implication 3 – Barriers to DT application: Key barriers to applying DT in practice exist.

Finally, although Martin (2009, p. 115) argues that “the larger the company, the less likely it will be perceptive to design thinking”, very limited research exists on the specific barriers which hinder organisational application of the concept. The study of Schmiedgen, et al. (2015) is one of the few which admits that it is a “real challenge when trying to roll out design thinking in an organisation that has other processes and ways of working”. This white spot in the DT research landscape is surprising given the finding that all interviewees stated difficulties applying the concept in their organisation. In order to fill this white spot and to

support practitioners in their DT initiatives, research on DT barriers and means to overcome these is recommended.

Implications for managers:

First, DT and BM innovation: DT can be integrated into the BMI process.

The study examined the application of the DT concept to the BMI process in OEMs. While the concept was perceived by all interviewees as a valuable facilitator of BMI, the applicability of it tends to vary across different BMI process phases. DT seems to be very well suited for the ideation and integration phase and slightly less for the initiation and implementation phase. Based on this study's findings and literature, this inquiry proposed an evidence-based integrative BMI process framework which is an attempt to give practitioners a tool to effectively innovate their BM through leveraging the potential of DT. Although the proposed framework should give practitioners some guidelines on how they could integrate DT into their BMI initiatives, its degree of abstraction still leaves space for individual adaptation.

Second, DT and BM dimensions: Elements of DT can be applied to all BM dimensions.

This project studied how DT as innovation method was applied to innovating different dimensions of the BM in OEMs. The research findings indicated that elements of the DT concept can be applied to the innovation of all four BM dimensions, albeit to a varying extent. DT seems to be highly applicable to innovating the value proposition and customer dimensions and seems to be slightly less applicable to innovating the value chain and profit mechanism. While the mind-set and cognitive approaches of DT can universally support the innovation of BM dimensions, practitioners complemented DT with non-DT tools to innovate some BM dimensions.

Third, Barriers to BMI: Organisational culture as a key inhibitor of BMI.

The third implication for practitioners is that BMI is, to a large extent, a people issue (Stampfl, 2016, p. 150), as the heterogeneous understandings of corporate innovation, cognitive lock-in effects and internal resistance to change are, according to the participants, key barriers to BMI. This finding, which is in line with the change management literature (Piderit, 2000, p. 784), emphasised the importance of creating a culture of innovation in organisations. The DT mind-set, which is perceived by some as a means to support change

management (Schmiedgen, et al., 2015, p. 60), could promote a culture facilitating (BM) innovation.

Finally, Barriers to DT application: Design Thinking starts with training.

The fourth conclusion which can be drawn from the study concerns the importance of creating internal awareness and understanding of the design thinking concept across the entire organisation. Interviewees mentioned the lacking understanding of the concept as a key barrier to its implementation and Schmiedgen, et al. (2015, p. 110) argue that design thinking projects are more likely to fail if the rest of the organisation does not appreciate or know the concept.

Limitations of Research Findings

This study is not without limitations. First, as a result of the lack of general definitions of this study's key conceptions, such as business model or business model innovation, this dissertation had to choose one of the many seminal definitions. A divergent theoretical foundation could lead to other findings. Furthermore, the validity of the design thinking concept is controversial within the research community (Kimbell, 2011; Johansson-Sköldberg, et al., 2013), wherefore a revisited theoretical concept could lead to different conclusions. Second, while the sample of participants, characterised by their great experience with DT, can be seen as a strength of this research, it can also become a limitation. The majority of participants indicated that DT represents a large part of their daily work. Hence, the participants had a positive attitude towards the method. Thus, a subliminal positive sample bias could be assumed leading to an overestimation of the applicability of DT. Third, this multi-case study was based on three German OEMs. Even though this industry was deliberately chosen as the unit of analysis due to the current changes it undergoes, the focus on solely one industry in one country limits the generalisability of the research findings. Research on another industry or country might lead to dissimilar conclusions. Finally, while the purpose of this research inquiry was not to recommend specific actions and rather to formulate theoretical propositions as basis for further research, the small sample size of six interviews can be seen as a limitation of the findings. Thus, research on the application of DT to BMI based on a larger sample is suggested.

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